

WHAT IS CLAIMED IS:

1. In a method for performing a multiplexed determination on a surface of a solid moiety comprising independently addressable sites, the improvement which comprises:
 - employing mixtures of lanthanide dyes for encoding said moieties in said solid moiety; and
 - decoding said sites by their emission spectra.
2. A method according to Claim 1, wherein said lanthanide dyes are chelates of Eu, Sm, Tb, and Dy.
3. A method according to Claim 1, wherein said lanthanide dyes code for a nucleic acid sequence bound to said moieties.
4. A method according to Claim 3, wherein said lanthanide dyes are chelates of Eu, Sm, Tb, and Dy
5. A method according to Claim 1, wherein said moieties comprise from 0 to 2 fluorescent dyes other than lanthanide dyes having an absorption wavelength overlapping the absorption wavelength of at least one of said lanthanide dyes.
6. A method according to Claim 1, wherein said moieties are particles of an average diameter in the range of about 5 nm to 1 mm.
7. A method for determining the presence of at least 5 different nucleic acid sequences in a sample comprising a mixture of nucleic acid molecules, said method comprising:
 - combining independently addressable particles with said sample, wherein said independently addressable particles are characterized by comprising a dye composition consisting of at least one lanthanide dye and from 0 to 2 fluorescent dyes other than lanthanide dyes, having an absorption wavelength overlapping the absorption wavelength of at least one of said lanthanide dyes, having nucleic acid

oligomers bound to the surface of said particles, wherein the sequence of said oligomers bound to said particle is related

to the emission spectrum of said dye composition of said particle under hybridization conditions;

separating particles to which sample nucleic acid molecules have hybridized;
and

identifying the sequence of said nucleic acid molecules bound to said particles by the emission spectra of said particles.

8. A method according to Claim 7, including the additional step of amplifying nucleic acid molecules or portions thereof in said sample.

9. A method for identifying at least 5 single nucleotide polymorphisms in a sample comprising a mixture of nucleic acid molecules, said method comprising:

combining independently addressable particles with said sample, wherein said independently addressable particles are characterized by comprising a dye composition consisting of at least one lanthanide dye and from 0 to 2 fluorescent dyes other than lanthanide dyes, having an absorption wavelength overlapping the absorption wavelength of at least one of said lanthanide dyes, having nucleic acid oligomers bound to the surface of said particles, wherein said oligomers bound to each particle hybridize to a nucleic acid molecule comprising a single nucleotide polymorphism;

extending said oligomers with a template dependent DNA polymerase, wherein extension requires the presence of said single nucleotide polymorphism;

separating particles having extended oligomers; and

determining the single nucleotide polymorphisms by determining the emission spectrum of each of said particles.

10. A kit comprising a plurality of independently addressable solid surfaces,

wherein said independently addressable particles are characterized by comprising a dye composition consisting of at least one lanthanide dye and from 0 to 2 fluorescent dyes

other than lanthanide dyes, having an absorption wavelength overlapping the absorption wavelength of at least one of said lanthanide dyes.

11. A kit according to Claim 10, having at least 10 different independently addressable solid surfaces.
12. A kit according to Claim 11, wherein said independently addressable solid surfaces are particles.
13. A kit according to Claim 10, wherein said lanthanide dyes are chelates of Eu, Sm, Tb, and Dy.
14. A kit according to Claim 13, having from 1 to 2 fluorescent dyes other than lanthanide dyes, having an absorption wavelength overlapping the absorption wavelength of at least one of said lanthanide dyes.
15. A kit according to Claim 10, wherein to each of said independently addressable surfaces is bound a different DNA oligomer, wherein the emission spectrum of each surface defines the sequence of the oligomer bound to said surface.
16. A kit according to Claim 15, wherein said surfaces are particles.
17. A kit according to Claim 10, wherein to each of said independently addressable surfaces is bound a poly(amino acid), wherein the emission spectrum of each surface defines the sequence of poly(amino acid) bound to said surface.
18. A kit according to Claim 17, wherein said surfaces are particles.